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Darwin Court, Gloucester Avenue, NW1

Airspace Group Ltd

Noise Impact Assessment

Revision 00

21/12/2023

Scotch Partners LLP

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Project Particulars

Client Name: Airspace Group Ltd

Project Name: Darwin Court, Gloucester Avenue, NW1

Disclaimer

Revision History

Revision	Description	Date	Prepared By	Checked By
00	Issue for comment	21 Dec. 23	Joel Mahay BSc AMIOA	Jacob Perry BMus IEng MIOA

Contents

1 Introduction

1.1 Proposals are in place for the extension of existing residential buildings at Darwin Court on Gloucester Avenue in Camden, to provide eight new dwellings.

1.2 The works involve the introduction of new residential dwellings as well as new building services equipment to be located at roof level.

1.3 Noise from building services plant has potential to impact on amenity of nearby noise-sensitive neighbours. Noise from nearby rail and road traffic has potential to impact on amenity of residents within new dwellings. This report presents assessments of noise impact and noise ingress against the expected requirements of the Local Authority, in support of the planning application for the scheme.

1.4 A noise survey has been conducted at the site to establish existing noise levels around the site, to inform both assessments. Details of the noise survey are presented in Chapter 3 of this report. Noise emissions are assessed in Chapter 4 and noise ingress is assessed in Chapter 5.

2 Criteria

2.1 Local Authority

2.1.1 The London Borough of Camden sets down its noise policy in *Camden Local Plan 2017* and *Camden Planning Guidance on Amenity.*

2.1.2 Policy A4 of the *Local Plan 2017* is as follows:

> *"Policy A4 Noise and vibration*
> *The Council will seek to ensure that noise and vibration is controlled and managed.*
> *Development should have regard to Camden's Noise and Vibration Thresholds (appendix 3). We will not grant planning permission for:*
> *a. Development likely to generate unacceptable noise and vibration impacts; or*
> *b. Development sensitive to noise in locations which experience high levels of noise, unless appropriate attenuation measures can be provided and will not harm the continued operation of existing uses.*
> *We will only grant permission for noise generating development, including any plant and machinery, if it can be operated without causing harm to amenity. We will also seek to minimise the impact on local amenity from deliveries and from the demolition and construction phases of development."*

2.1.3 The Local Plan 2017 includes noise thresholds, which apply to noise ingress to the proposed dwellings and noise emissions from the proposed building services equipment. The Local Plan states that:

> *"The significance of noise impact varies dependent on the different noise sources, receptors and times of operation presented for consideration within a planning application. Therefore, Camden's thresholds for noise and vibration evaluate noise impact in terms of various 'effect levels' described in the National Planning Policy Framework and Planning Practice Guidance:*
> - *NOEL -No Observed Effect Level*
> - *LOAEL – Lowest Observed Adverse Effect Level*
> - *SOAEL – Significant Observed Adverse Effect Level*
>
> *Three basic design criteria have been set for proposed developments, these being aimed at guiding applicants as to the degree of detailed consideration needed to be given to noise in any planning application. The design criteria outlined below are defined in the corresponding noise tables. The values will depending on the context, type of noise and sensitivity of the receptor:*

- *Green – where noise is considered to be at an acceptable level.*
- *Amber – where noise is observed to have an adverse effect level, but which may be considered acceptable when assessed in the context of other merits of the development.*
- *Red – where noise is observed to have a significant adverse effect."*

2.1.4 Figure 2.1 shows noise thresholds regarding noise ingress to new noise-sensitive residential development.

Table B: Noise levels applicable to noise sensitive residential development proposed in areas of existing noise

Dominant Noise Source	Assessment Location	Design Period	LOAEL (Green)	LOAEL to SOAEL (Amber)	SOAEL (Red)
Anonymous noise such as general environmental noise, road traffic and rail traffic ~	Noise at 1 metre from noise sensitive façade/free field	Day	<50dB$L_{Aeq,16hr}$*	50dB to 72dB$L_{Aeq,6hr}$*	>72dB$L_{Aeq,16hr}$*
		Night	<45dB$L_{Aeq,8hr}$3 <40 dB$L_{Aeq,8hr}$**	45dB to 62dB$L_{Aeq,8hr}$* >40dBL_{night}**	>62dB$L_{Aeq,8hrs}$*
	Inside a bedroom	Day	<35dB$L_{Aeq,16hr}$	35dB to 45dB$L_{Aeq,16hr}$	>45dB$L_{Aeq,16hr}$
		Night	<30dB$L_{Aeq,8hr}$ 42dB$L_{Amax,fast}$	30dB to 40dB$L_{Aeq,16hr}$ 40dB to 73dB$L_{Amax,fast}$	>40dB$L_{Aeq,\ 8hr}$ >73dB$L_{Amax,fast}$
	Outdoor living space (free field)	Day	<50dB$L_{Aeq,16hr}$	50dB to 55dB$L_{Aeq,6hr}$	>55dB$L_{Aeq,16hr}$
Non-anonymous noise	See guidance note on non-anonymous noise				

Figure 2.1 Camden noise thresholds, Table B from Appendix 3 of the Local Plan 2017

2.1.5 Figure 2.2 shows noise thresholds set regarding noise emissions from industrial and commercial developments. The Local Plan also states:

"A relevant standard or guidance document should be referenced when determining values for LOAEL and SOAEL for non-anonymous noise. Where appropriate and within the scope of the document it is expected that British Standard 4142:2014 'Methods for rating and assessing industrial and commercial sound' (BS 4142) will be used. For such cases a 'Rating Level' of 10 dB below background (15dB if tonal components are present) should be considered as the design criterion."

Table C: Noise levels applicable to proposed industrial and commercial developments (including plant and machinery)

Existing Noise sensitive receptor	Assessment Location	Design Period	LOAEL (Green)	LOAEL to SOAEL (Amber)	SOAL (Red)
Dwellings**	Garden used for main amenity (free field) and Outside living or dining or bedroom window (façade)	Day	'Rating level' 10dB* below background	'Rating level' between 9dB below and 5dB above background	'Rating level' greater than 5dB above background
Dwellings**	Outside bedroom window (façade)	Night	'Rating level' 10dB* below background and no events exceeding 57dBL_{Amax}	'Rating level' between 9dB below and 5dB above background or noise events between 57dB and 88dB L_{Amax}	'Rating level' greater than 5dB above background and/or events exceeding 88dBL_{Amax}

Figure 2.2 Camden's noise thresholds, Table C from Appendix 3 of the Local Plan 2017

2.2 British Standard 4142:2014 +A1:2019

2.2.1 BS 4142:2014+A1 2019 *Methods for rating and assessing industrial and commercial sound* presents a method for predicting noise impact on noise-sensitive neighbours. This is done by comparing the noise level of a source (the *specific* sound level) with the existing background noise level in the area, in the absence of the source (the *background* sound level).

2.2.2 The methodology requires consideration be given to all aspects of the assessment process and it must also account for any unusual acoustic features, such as tonal, impulsive, and intermittency characteristics. These are accounted for by the addition of various decibel corrections to the specific sound level. This corrected level is the *rating* level.

2.2.3 The greater the positive difference between the rating level and the background level, the greater the magnitude of the impact. BS 4142:2014 gives the following descriptions with regards to the potential impact:

- A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending upon the context.
- A difference of around +5dB or more is likely to be an indication of an adverse impact, depending upon the context.
- Where the rating level does not exceed the background sound level, this is an indication of a low impact, depending upon the context.

2.3 BS 8233:2014

2.3.1 British Standard 8233:2014 *Guidance on sound insulation and noise reduction in buildings* presents recommendations for aspects of building acoustics including insulation against outdoor sound. Guideline limits are given specifically for internal ambient noise levels in dwellings; meeting these levels is considered standard industry practice.

2.4 ProPG: Planning and Noise

2.4.1 *ProPG: Planning and Noise, New Residential Development 2017* presents further guidance on noise control for residential schemes and, in addition to internal ambient noise levels, presents recommended internal maximum noise levels based upon World Health Organisation guidance.

2.5 Criteria Summary

2.5.1 As the assessment is considered to fall under the scope of BS 4142, a rating level that is below the background level by at least 10 dBA (and by at least 15 dBA if a tonal character is present) is to be targeted in line with the Camden Local Plan. It is believed this would fall under the 'Green' category within the noise thresholds, but that an 'Amber' classification might be considered acceptable depending on the wider context of the development, and/or practicalities of meeting 'Green'.

2.5.2 Suitable internal noise level limits shall be set according to those recommended within BS 8233:2014 and ProPG: Planning and Noise and these shall be targeted in the assessment of noise ingress, which is in line with typical industry practice.

3 External noise survey

3.1 Site description

3.1.1 Darwin Court is located close to Primrose Hill in Camden. The site consists of three residential blocks bound by major railways to the north and Gloucester Avenue to the south.

Figure 3.1 Map showing wider area with approximate site boundary drawn in red. Courtesy of OS Maps

3.1.2 During daytime site visits, the noise climate at the front of the site was observed to be influenced by ground works on Gloucester Avenue. These works include the temporary closure of parts of Gloucester Avenue and as such the daytime noise levels recorded are not considered representative of the typical acoustic environment which would ordinarily be influenced by road traffic, which would include buses, on Gloucester Avenue.

3.1.3 Frequent rail passbys were observed to be dominant towards the rear of the site, and in areas not screened by the towers.

Figure 3.2 3D map showing existing residential towers comprising Darwin Court, taken from Planning Submission Documents.

3.2 Measurement methodology

3.2.1 Continuous, unattended noise level measurements were conducted at two rooftop positions between 13th and 18th October 2023. The measurement locations are shown in Figure 3.3.

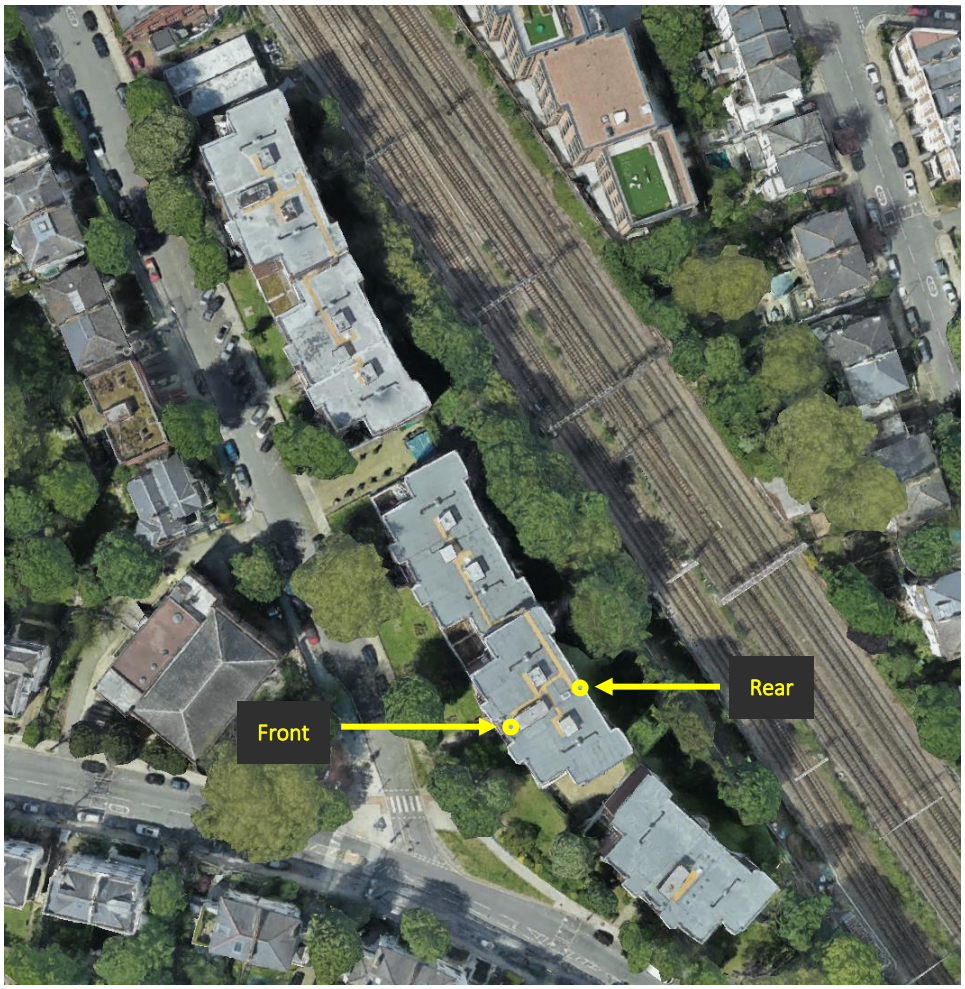


Figure 3.3 Aerial view of site with measurement positions indicated (image courtesy of Google)

3.2.2 The microphone at the rear location was approximately 2m above local ground level and so the measurement results are considered to approximate *free field* levels.

3.2.3 The microphone at the front location was within approximately 1.5m of reflective surfaces and so these results are considered to represent *façade-reflected* levels. A -3dB correction is to be applied to results from this survey.

3.2.4 Measurements were undertaken in accordance with the procedures advised within British Standard 4142: 2014: *Methods for rating and assessing industrial and commercial sound* and British Standard 7445-1: 2003 *Description and measurement of environmental noise.*

3.2.5 The sound level meter recorded statistical and octave-band spectral data in 15-minute samples. The "fast" (125ms) time-weighting was used.

3.2.6 The following equipment was used to carry out the measurements:

Table 3.1 Noise survey equipment

Equipment	Type	Serial No.
Norsonic 145	Class 1 sound level meter	14529820
Norsonic 131	Class 1 sound level meter	1312766
Norsonic 1218	External microphone enclosure	12182561
Norsonic 1251	Portable sound calibrator	34926
Norsonic 1255	Portable sound calibrator	125525800

3.2.7 The calibration of the sound level meter and associated microphone were checked prior to and on completion of the survey in accordance with recommended practice. No significant drift in calibration occurred during the survey. The accuracy of the calibrator can be traced to National Physical Laboratory Standards.

3.2.8 The weather during the survey was believed to be generally dry with little wind, and so is not expected to have impacted the measurements.

3.3 Results & commentary

3.3.1 Level-history charts for the measurements are shown on the following pages.

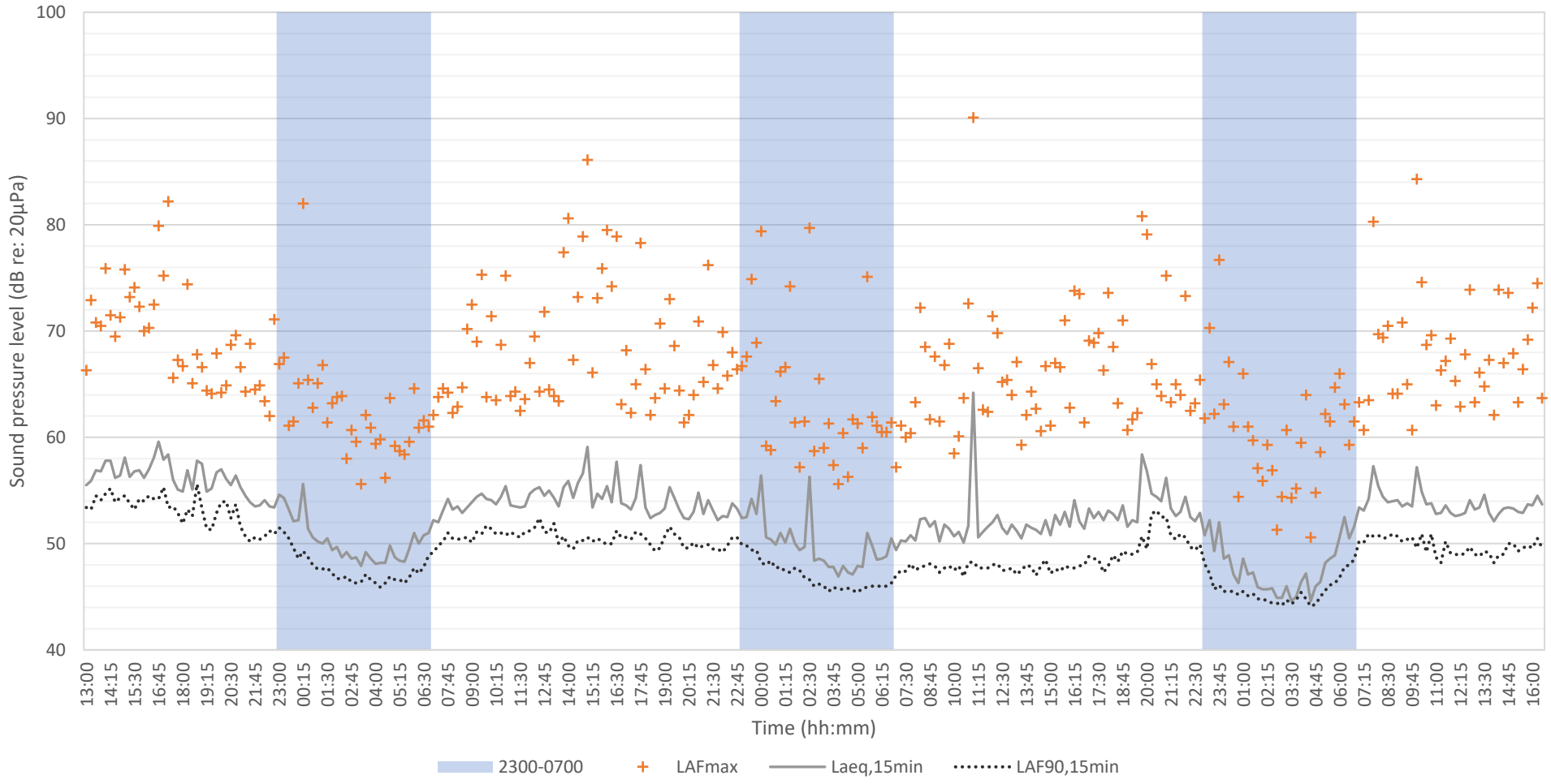


Figure 3.4 Sound level history chart for the front position ***(façade-reflected levels)***

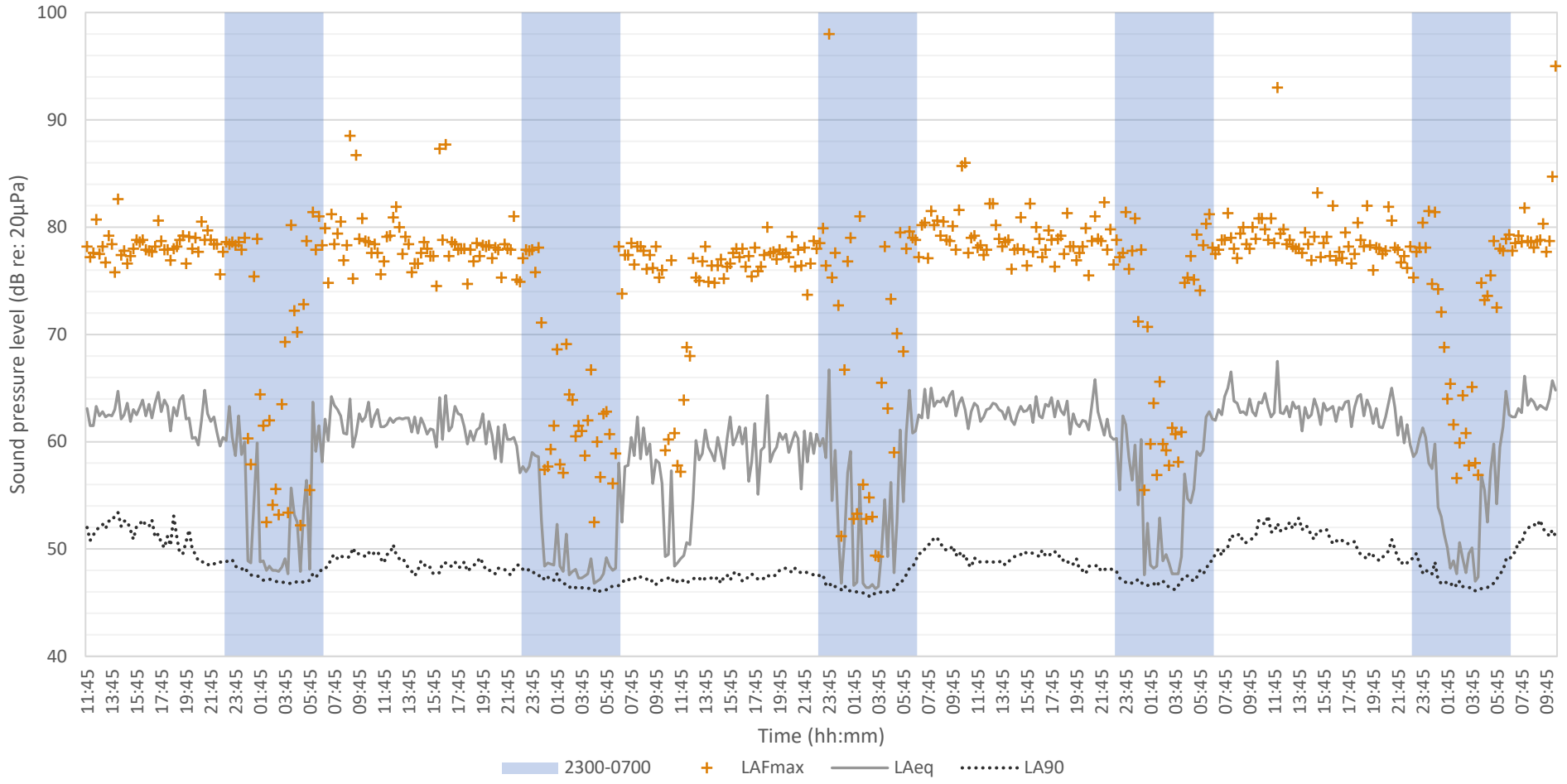


Figure 3.5 Sound level history chart for the rear position, overlooking the railway ***(free-field levels)***

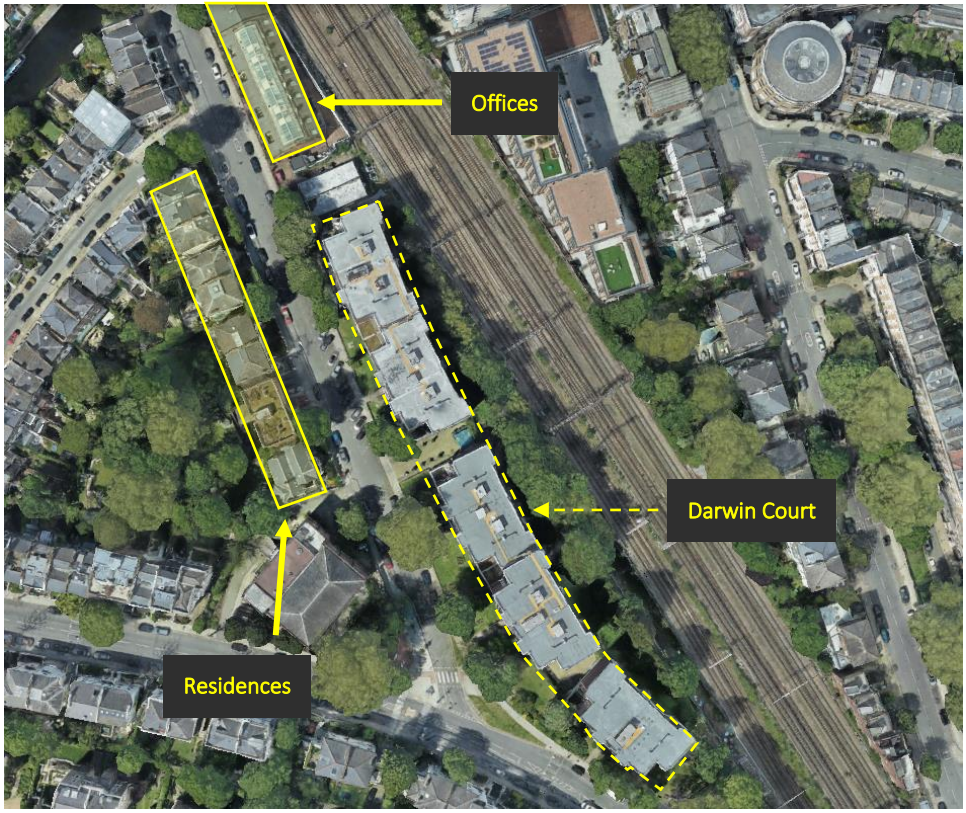
3.3.2 Results from the front position show relatively steady ambient ($L_{Aeq,15min}$) and background ($L_{A90,15min}$) levels during daytime hours, which steadily decrease by c.5-10dB overnight. The overnight levels at this location show that noise levels drop most on Sunday night, which is typical of a suburban location. This is thought to be caused by a decrease in road traffic on surrounding streets and roads.

3.3.3 Results from the rear position show consistent ambient and maximum (L_{AFmax}) noise levels influenced by rail passbys during daytime hours, with a consistent drop to lower overnight levels, at which point the dominant source is believed to be road traffic. Background noise levels increase comparatively little during the day, as these are not influenced by rail activity.

4 Noise emission assessment

4.1 Nearest noise-sensitive receivers

4.1.1 The closest noise-sensitive receivers to Darwin Court are offices to the north at 36 Gloucester Avenue ('The Vineyards') and residential properties across Gloucester Avenue. The office block is approximately 27m in plan from the closest tower of Darwin Court and the residential properties are approximately 30m in plan from Darwin Court. These are shown below:



4.1.2 The lowest measured background sound level during the survey was 41 dB $L_{A90,15min}$. This occurred at the front location during night-time and is considered representative of background levels at the noise-sensitive receivers.

4.2 Noise sources

4.2.1 It is proposed that condensers will be installed on the new roof levels in broadly similar arrangements to the existing layout. The loudest currently proposed unit is *PUZ-WM112VHA(-BS)* manufactured by Mitsubishi. The stated maximum noise level of this unit, from manufacturer's literature, is as follows:

Table 4.1 Noise level data for PUZ-WM112VAA(-BS).UK from Mitsubishi technical manual

Octave band centre frequency (Hz) / Sound pressure level at 1m (dB)							
63	125	250	500	1000	2000	4000	8000
54.5	57	46	44	42	35	33	27

4.3 Predicted specific sound levels

4.3.1 Noise propagation has been calculated using a geometric divergence model in accordance with *BS 9613-2 1996 Attenuation of sound during propagation outdoors*.

4.3.2 The specific sound levels predicted at both assessment locations are as follows:

Table 4.2 Specific sound levels predicted at nearest noise-sensitive neighbours

Location	Predicted specific sound level
Offices at 36 Gloucester Ave.	20 dB $L_{Aeq,T}$
Residences across Gloucester Ave.	22 dB $L_{Aeq,T}$

4.3.3 Installed plant will be selected to not exceed these noise levels.

4.4 Predicted rating levels

4.4.1 While air source heat pumps are not typically considered tonal during normal operation, there is potential for clearly tonal noise during other infrequent operation modes such as while defrosting. A penalty of +4 dB has been applied as a precaution.

4.4.2 No penalties for impulsivity or intermittency are considered necessary.

4.5 Context

4.5.1 Noise from the proposed equipment is expected to be similar in nature to existing plant at roof level. As such, the acoustic environment is not expected to be considerably changed by the proposed installation.

4.6 Assessment of noise emissions

4.6.1 The predicted rating levels and background sound levels at each receiver are as follows:

Table 4.3 Summary of rating levels and background levels at noise-sensitive receptors

Location	Background level	Rating level	Difference
Offices at 36 Gloucester Ave.	41 dB $L_{A90,15mins}$	24 dB L_{Ar}	-17 dB
Residences across Gloucester Ave.	41 dB $L_{A90,15mins}$	26 dB L_{Ar}	-15 dB

4.6.2 It is concluded that, as the predicted rating levels are below the background levels at both receptors by at least 15 dBA and the context does not warrant further measures, the proposals are expected to fall under the 'Green' category when assessed by the Local Authority and would therefore be acceptable on grounds of noise emissions.

5 Noise ingress assessment

5.1 Overview

5.1.1 An assessment of external noise break-in to bedrooms has been undertaken to demonstrate that the noise thresholds set by the Local Authority can be met.

5.1.2 External free-field noise levels in octave bands used within this assessment have been taken from the survey data. These are summarised using single figure values as follows:

Table 5.1 Ambient and maximum noise levels to be used in the assessment of noise ingress

Metric	Location	Time	Level
Ambient, $L_{Aeq,T}$	Front	Daytime (07:00-23:00)	51 dB $L_{Aeq,T}$
		Night-time (23:00-07:00)	48 dB $L_{Aeq,T}$
	Rear	Daytime (07:00-23:00)	63 dB $L_{Aeq,T}$
		Night-time (23:00-07:00)	58 dB $L_{Aeq,T}$
Maximum, L_{AFmax}	Front	Night-time (23:00-07:00)	74 dB L_{AFmax}
	Rear	Night-time (23:00-07:00)	82 dB L_{AFmax}

Note: All values represent free-field sound pressure levels re: 20µPa. Maximum values have been determined by analysis of survey data and genuinely infrequent noise events occurring no more than once have been discounted. These therefore represent typical worst-case maximum levels.

5.1.3 The level of noise ingress is dependent upon the external noise levels, as well as the dimensions and internal characteristics of the room. Calculations are based on room properties shown in the latest architectural drawings, as prepared for this planning submission.

5.1.4 It is proposed that internal ambient noise levels are controlled to meet those suggested in BS 8233:2014 and *ProPG: Planning and Noise*. These are presented in Table 5.2.

Table 5.2 Internal noise levels suggested for dwellings by BS 8233 and ProPG.

Time	Indoor noise level
Daytime (07:00-23:00)	≤35 dB $L_{Aeq,16hour}$
Night-time (23:00-07:00)	≤30 dB $L_{Aeq,8hour}$
	45 dB L_{AFmax} *exceeded <10 times per night*

5.1.5 Camden's noise thresholds for the 'Green' category as set out in Appendix 3 of the Local Plan are broadly in line with those stated above with the exception of the maximum noise limit. 42dB L_{AFmax} is set as the limit for the 'Green' category with 40dB to 73dB L_{AFmax} classified as 'Amber'.

5.1.6 The viability of open windows as an overheating mitigation strategy in dwellings depends partially on the level of external noise. Approved Document O to the Building Regulations (2019) states that windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits:

a. 40dB $L_{Aeq,8h}$ overnight (23:00-07:00)

b. 55dB L_{AFmax} more than 10 times a night

5.2 Noise ingress calculation

5.2.1 Calculations have been undertaken in general accordance with BS 12354-3:2017.

5.2.2 It has been found that noise levels can be controlled to within the limits in Table 5.2 provided façade elements meet the following sound insulation performances:

Table 5.3 Sound insulation performances required for internal noise criteria within bedrooms

Element	Laboratory sound insulation performance, dB *R*							
	63 Hz	125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz	8k Hz
Opaque façade elements	36	40	46	51	53	50	50	50
Glazing	24	26	33	41	52	54	61	61

5.2.3 It is expected that these performances can be met with typical solid façade constructions and acoustic laminate double glazing. Note that glazing sound reduction performances must be achieved when including for the effect of any framing losses.

5.2.4 Living room/kitchen areas may be compliant with a reduced window specification due to the less onerous criterion.

5.3 Overheating strategy

5.3.1 Noise break-in calculations have been conducted in line with BS 12354-3, with empirical sound reduction data for open windows to predict noise levels in bedrooms during overheating mitigation.

5.3.2 A summary of expected internal noise levels while windows are open is provided below with comparisons to limits described in Approved Document O (AD-O).

Table 5.4 Summary of openable window assessment*

Location	Metric	Predicted internal noise level	AD-O Conclusion
Front	Average, $L_{Aeq,8h}$	33 dB	<40dB Below AD-O limit; windows may be open
	Maximum, L_{AFmax}	61 dB (~3 exceedances of 55 dB)	<10 exceedances Below AD-O limit; windows may be open
Rear	Average, $L_{Aeq,8h}$	43 dB	>40dB Above AD-O limit; windows likely to be closed
	Maximum, L_{AFmax}	67 dB (~14 exceedances of 55 dB)	>10 exceedances Above AD-O limit; windows likely to be closed

**It is possible that openable windows as a means of overheating mitigation will not be used in the design; this assessment is intended to demonstrate the suitability only.*

5.3.3 It has been found that, according to Approved Document O, windows **may** be assumed to be open overnight **on the front façades**, overlooking the road.

5.3.4 However, external noise levels differ such that windows **may not** be assumed to be open overnight **on the rear façades**, overlooking the railway.

5.3.5 Openable windows may be installed, but should not be relied upon for the overheating assessment for façades overlooking the railway.

6 Conclusions

6.1 Proposals to remodel and extend residential buildings at Darwin Court, Gloucester Avenue, NW1 have been assessed for their suitability in terms of noise and in accordance with the expected requirements of the Local Authority.

6.2 An external noise survey has been conducted at two locations to determine existing background, ambient and maximum noise levels. This has been used to assess noise emissions from mechanical equipment serving Darwin Court, as well as noise ingress from environmental noise sources surrounding Darwin Court.

6.3 It is concluded that the level of noise emissions from building services plant when assessed at any noise-sensitive neighbour is expected to be in line with the 'Green' category set out in the Camden Local Plan 2017.

6.4 It is concluded that the level of external noise ingress can be controlled such that internal noise levels in relevant noise-sensitive spaces is expected to be in line with the 'Green' category set out in the Camden Local Plan 2017.

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